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LARUELLE AND QUANTUM THEORY

GENERICSCIENCE   IDEMPOTENCE, LATUELLE, NON GENERIC SCIENCE, NON–COMMUTATIVITY, SUPERPOSITION

Laruelle offers a conception that links quantum theory as a science with philosophy. For Laruelle, the transcendental and the a priori have clearly changed their content and meaning in philosophy today. Philosophy remains transcendental insofar as its definition as a priori involves a superimposition and an interweaving that interweaves the quantum real and the universe. Thus the transcendental finally takes up the idea of the universe and changes into the quantum form of superposition. It is now a matter of thinking two events together, namely the quantum and the transcendental. While the quantum requires the superposition of waves, the transcendental is one-sided and always displaced with respect to its center (as opposed to a transcendental point or peak); it is an asymmetrical and vertical determination by an

outer/inner peak. This is by no means to be understood as a philosophical reversal of Platonism, but rather as a scientific or quantum scientific infusion, which is scientifically possible here because quantum theory again incorporates aspects of philosophical, but not idealistic, provenance.

There is nothing artificial or fashionable about the introduction of quantum physics into quantum theory; rather, it is the interpretation of the aspect of a non-mathematical physics that is capable of revitalizing both philosophy and science as quantum theory. For Laruelle, what is at stake here is not a philosophical reading of physics or even a quantum metaontology, but a quantum-oriented philosophy, simply written out as "Planck" instead of "Newton". Quantum physics enables, as Laruelle and Görnitz claim in unison, the most fundamental or universal quasi-non-ontology, while mathematics is still too abstract and biology is already too specific. For Laruelle in particular, it is a matter of creating a general theory fiction that is capable of relating the various scientific disciplines to one another, whereby philosophy is not abandoned any more than physics. For Laruelle, the aim is in particular to invent a non-standardized philosophy in order to achieve a generic extension of quantum physics, i.e. the aim is by no means a purely epistemological description. Nor is it a question of extending a method that might be described as "proto-quantical" to other areas of knowledge, but rather of creating a quantical and radically generic style that can materialize in the most diverse objects of knowledge.

In his current writings, Laruelle uses two universal quantum principles or quantum axioms, superposition and non-commutativity, to represent generic science. Superposition is understood as a continuation of radical immanence and non-commutativity as determination-in-the-last-instance. For Laruelle, these two principles express the real (not the One, which assumes a metaphysical status here), they immediately provide the real and the syntax. The economy of the generic machine consists in the organization of the material according to a "quantware" (instead of software), which in turn participates in the material. However, Laruelle does not always seem to be entirely clear in his formulations, for example when he speaks of the "wave/particle superposition" and at the same time of the "determination-in-the-last-instance", or of the "unilateral duality" and at the same time of "complementarity" or finally even of "unilateral complementarity". The latter phrase obviously poses a problem, as Bohr's concept of complementarity does not refer to determination, but to vagueness and indeterminacy. For Laruelle, "unilateral complementarity" encompasses various dualities that relate to the primitive duality of wave/particle.

For Laruelle, the essence of the primitive wave/particle duality is the unilateral duality, whereby he favors the wave and not the dialectic or the indeterminacy as in Bohr. Thus the two variables can be reversible, but always from the point of view of their unilaterality. With regard to determination or unilaterality, the term complementarity can certainly be retained as a supplement, insofar as the particle of the wave (and its radical immanence) is added, which sub-determines it. Unilaterality includes the One as One-in-One, a radically immanent being, or is itself given as the property of the One as One-in-One.

According to Laruelle, in the quantum superposition, which includes a relation or rather a uni-lation, one should first think of the waveform or rhythm (as a temporal pattern), which can be

characterized by the parameters of time, space, frequency, amplitude and superposition.

The rhythm integrates the superposition of the waves and their molecular movements, whereby diverse undulations can cross, absorb and thread into each other. Think of the waves on the beach, for example, which are not entities, but rather currents that flow extensively in space. If two waves overlap or overlap, then the amplitude of the resulting wave (which is neither a synthesis of the two waves nor a "new" wave; it is a combined amplitude of the first two waves, i.e. the amplitude of the second wave is added to the first wave, and the result is a wave with combined amplitudes, the superposition of the two waves.

Thinking here is not oriented towards the object, but towards the amplitude. It is about the idempotent addition of two waves that remain waves of the same type. The superposition can be neither constructive nor destructive with regard to two concrete wave phenomena or abstract objects (complex numbers). It should be added that the superposition neither leads to an identification of two corpuscular identities, which are added together to form a whole, nor to a supplement that wants to exceed a whole through its différance, but to a singular wave at each point in time (interference). Laruelle also borrows the principle of non-commutativity from quantum physics. It implies that two inverse products or physical quantities cannot be equal and exchangeable at the same time. Although there is an inversion of the products of variables, this is always from the point of view of their non-comutativity. In this respect, unilaterality applies not only to two, but to four terms. If the principle is now inserted into a unilateral order, then it is considered generic.

To the quantum physical principles of superposition and non-commutativity Laruelle adds the concept of idempotency.
The term idempotency stands for a quasi-mathematical rule that originates from information science and is used to describe the superposition of two waves in one (1+1=1). Idempotence is by no means to be understood as a mere addition or multiplication by means of the unit of number, and it does not lead to the synthesis of the two waves in a third wave, but rather states that the waves always remain the same waves. Idempotence thus includes the algebraic property of certain operations ($A + A = A$) and is interpreted by Laruelle as the phenomenological property of superposition and its immanence. It can also be called the principle of undulation or the a priori form of the particle. Undulation here always refers to the topic of "quantum wave and particle", the latter in contrast to the corpuscle (individual body).

In contrast to mathematical quantum mechanics, Laruelle prefers the wave rather than the particle, and he also distinguishes the corpuscle from the particle, which has a generic form. Wave and particle are the same and/or distinct, i.e. there is the wave/particle form according to an objective phenomenon. Wave and particle are not the same insofar as there is non-commutativity between wave and particle. They are different insofar as the wave is a radically immanent phenomenon (superposition) and the particle stands for the excess of a simple transcendence that does not remain closed to immanence. It should be clear that Laruelle understands the quantum principles neither as principles of a first philosophy nor as positive principles of mathematics/physics, but as in-the-last-instance determinant (more precisely sub-determinant, because purely formal) posits that are always to be applied according to the

real. And generic science has to operate with the help of these two principles in such a way that it produces more complex results than the materials it uses from science and philosophy, if it wants to develop its own theoretical practice, that is, to establish a relation between science and philosophy in the immanence of a "logical" connection, which Laruelle calls "unilateral dualism" (under the dominance of a "logical" connection).

In his current writings, especially in *Philosophie non-standard. générique,quantique, philo-fiction,* Laruell mobilizes a series of terms from quantum physics, although he refrains from mathematical-quantitative articulation. A generic "quantification" of philosophy at this point involves at best a science-in-numbers without calculation. In this way, Laruelle finally arrives at a vector or wave-particle conception of concepts. By this he understands conceptual quantum phenomena that are to be classified as virtual and do not refer to reality, but to the real qua the immanence of the same – the real for which the principles of superposition and non-commutativity as well as idempotence are absolutely valid. These principles should enable theoretical practice to hypothesize, describe and experiment according to the real.

Accordingly, generic science should be understood as a second-degree quantum theory or as the quantum physics of macroscopic objects. The generic method operates by extracting a minimum invariant from the various scientific disciplines or philosophies, such as the imaginary number from analysis, the wave from quantum physics, the transcendental from philosophy, capital from economics, etc. These invariants are to be superimposed on the quantum theory. These invariants must be superposed, or, in other words, they must be introduced into the mode of superposition as theoretical givens. The materials of science or philosophy are thus to be brought into a material, conceptual formalism, i.e. they are themselves to be brought into the state of superposition as vectors, i.e. into the context of generic science, which operates with the (vectorial) concept of the wave rather than with concepts such as corpuscle and point. The real theoretical conditions are treated as vectors in the superposition state, so to speak, which in quantum physics is indexed with the imaginary numbers. The vectorial dimension is introduced by the imaginary numbers, and for Laruelle this means that the theoretical facts on the complex plane are represented as vectors with a real and an imaginary part. (In quantum physics, the vectorial dimension is indexed by the complex imaginary numbers – these are vectors with a real and an imaginary part).

Take, for example, the Laruellian concept of the "quarter turn". It stands for the geometric representation of the complex, imaginary numbers and is denoted by the square root -1. A complex number has two parts: a real part and an imaginary part, for example $2 + 3i$. In geometry, if you draw a real line and place an imaginary line at a right angle, you can represent the complex number as a point on the graph (with its two axes). Multiplying a number by i and rotating the line clockwise 90 degrees from the origin is equivalent here. The following can also be written: $1 * i = 1i$, $1i * i = -1$ Because the square root of i is -1, $n * i * i = n * -1 = -n$. This is exactly the "quarter turn". To summarize it briefly and concisely as a circle: The real becomes the imaginary, the imaginary becomes the negative real, the negative real becomes the negative imaginary, and the negative imaginary becomes the real.

The wave function combines symbols that originate from philosophy (one, being, other, multiplicity, given etc.) or science and are "touched" by imaginary or complex numbers, so

that ultimately a "quarter turn" or a circle is created, or to put it in phenomenological terms, a unilateral duality. This is always an undulatory process and not the addition of stages. Although we often speak of a vector stage, the vectoriality of the vector is itself a process and not the stage or the object of a mathematical operation. As part of the vectorial form of immanence and transcendence, the "quarter turn" constitutes the pre- undulatory substance, or at least it serves as material or as material implementation.

It is thus considered a generic element of undulation: to the generic superposition of the "quarter turn" with itself and the superposition with the wave, the components of directionality and transformation must also be added. At this point, Laruelle hastens to point out that within the generic matrix (the connection of philosophy and quantum logic as variables that exist in radical immanence, even in the sense of a rhizome), the variables are to be understood as terms or concepts rather than (imaginary) numbers, whereby a complex or imaginary function of terms (the aspect of fiction) is now to be assumed. (Laruelle 2014: 159) This is not a question of solving equations with a number that is neither positive nor negative, but Laruelle is indeed dealing with a philosophical problem that mathematics itself raises.

The vector is characterized by the two operations of superposition and addition (addition of the arrows), whereby the aim is by no means to achieve a closed whole, but rather to achieve unclosed summations. The first term, which refers to the unilateral dimension of the vector or the wave (immanence of relations as uni-lation), remains decisive here, whereby the particle (second term) is immanently secured in the wave-like flow as a clone, in a wave-like elevation that suspends the transcendental-empirical doublet or the eternal cycle of time. The unilateral duality again represents the "set", both on the side of the clone and on the side of the vector. The result is immanence, one-in-one, which carries the two-in-one (clone=two).

Laruelle would probably contradict Karen Barad's postfeminist, quantum-theoretically inspired conception of technology, with which she conceives a quantum-mechanical indeterminacy in the course of recourse to Derridean différance, whereby terms such as relation, phenomenon and folding-in represent important components of the concept for determining or sharpening the indeterminacy, insofar as the indeterminacy is relativized or cut. For Laruelle, on the other hand, the generic transforms relation radically into uni-lation, into a unidirectional process that has never begun and never ended and to which a matrix is inherent; a transfinite process that radically reduces the predominance of both the scientific incision and the phi- losophical infinite. On the one hand, Laruelle wants to overcome the conceptual, which functions like a particle wave, and on the other hand he wants to install a new generic thinking apparatus, two variables that are connected to each other by inverse relationships. The thinking apparatus is itself defined as a part of the generic matrix, whose variables thus comprise the objects and the non-philosophical and quantum-mechanical interpretation of the objects. Clonality here combines unilateral comple- mentality with virtuality, the writing of the clone, which is virtual in the last instance. Here, the onto-vectorial of the thinking apparatus itself generates a complex reading of the vectorial of the objects, and this leads to an onto-vectorial interpretation of the theory as a model. These are vectors or imaginary concepts/ philosophies that replace the ima- ginary numbers. As a subtraction of every transcendence, the vector indicates the following: "The vector points to the surface of reality, which it traverses in a tunnel and with which it mixes before extending itself by returning to itself and

creating the objective semblance of *an-itself*.

1 If ψ_1 and ψ_2 are solutions to waves, then any arbitrary linear combination of the two solutions is a solution to SE (SE is a linear equation). If each of the individual solutions is multiplied by an arbitrary complex number and added together, the sum is again a solution, $\psi = a\psi_1 + b\psi_2$, as long as the coefficients are related as follows: $/a/2 + /b/2 = 1$ In this case, the solutions are visible wave functions. The superposition is a feature of the behavior of material waves as a quantization of the world.

2 In geometry, the vector is a line of fixed length, but it has no fixed position. It can therefore be thought of as a channel that imposes certain requirements that are not only used to connect different nodes, but also to bring these nodes forward in the first place. The vector can also be thought of as part of a vector field, which may even have a deformable geometry. What is of interest here, however, is not the deceptive dimension, but the tactics and the experiment. For Laruelle, the vector is a) the module-phase machine (immanence-transcendence) of uni-lateral and not at all of bi-linear inseparability that cuts/flows (Deleuze), b) the vector consists of minimal or old material of the "quarter turn", i.e. it exists as the amp-litude of the experience of thought (not the desiring machine), and c) it is produced by the superposition in the last instance rather than by the body without organs. Vectorial machines are by no means given as two-sided in the stage of belonging or as part of passive synthesis, but as radically immanent machines.

3 Generic science is a thoroughly experimental performance that generates undulatory interferences and collisions of conceptual particles by means of a non-mathematized wave theory. In order to create generic extensions of the initial model, the "generic matrix" (on the one hand a "paradigm" in the sense of Thomas Kuhn, on the other a "model" in the formalistic sense of mathematics) itself must be reinvented again and again in all its parts. It is therefore not only a matter of inventing a new form of thinking, but also, in particular, of investigating the form of the invention itself, or, to put it another way, of inventing the generic as an inventive force or as "invention-in-person".

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META

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